Xen Virtualization in an Enterprise Environment

Los Alamos NATIONAL LABORATORY — EST.1943

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Abstract:

The purpose of this project is to test the scalability and potential uses of Xen Virtualization. We tested Xen on a cluster of eleven nodes of which nine would contain virtual nodes. Each of the physical machines ran on two AMD Opteron 250 CPU's accompanied by 2GB of RAM. One of the project's main goals is to see how many virtual machines can possibly be brought up on one physical node with limited hardware sources.

Challenges:

The shared resources of virtual machines does not allow us to test performance based benchmarks such as llcbench.

Briefly about Xen

Xen is open source software that was developed as a part of research project at the University of Cambridge.

Xen is a bootable kernel that runs on a Linux system and acts as a hypervisor allowing guest machines to run on the same hardware, but enabling uniqueness of every single machine.
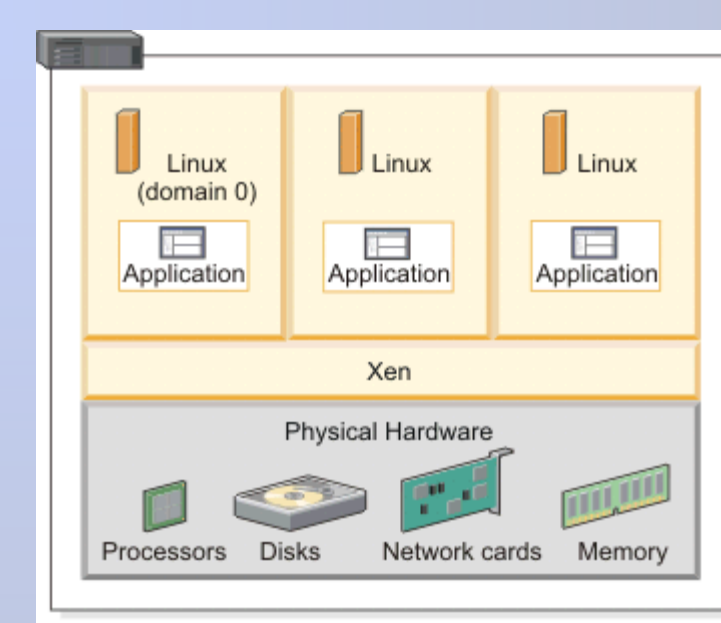
Cluster (with 225 virtual machines)

Cluster Specifications:

Physical Machine:
2 x AMD Opteron 250 CPU's, 2GB RAM, holds 25 virtual machines
Virtual Machine:
Runs Fedora Core 6 OS on 64MB of RAM

Archived Results:

By turning off unnecessary services and removing certain kernel modules we were able to boot a Fedora Core 6 guest OS on only 64MB of RAM. This enables us to bring up the maximum amount of virtual machines possible on any set of hardware. This also decreases the time it takes each virtual machine to boot.

The virtual file system size was also minimized by utilizing network mounted drives. This greatly reduces the need for physical disk usage.

We used cloning method of one virtual node, which we set up, in order to create other virtual machines. We also wrote several scripts that automate cloning, configuration, and the start up processes.

With a very slim OS configuration and only 64MB of RAM, we were able to bring up 25 virtual machines on every physical node in the cluster and run simple MPI programs.

Impact on the Lab

Xen Virtualization gives the lab the opportunity to set up inexpensive systems that simulate the behaviour of much larger systems, allowing for a dense test environment for numerous applications.

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